CERTIFICATE OF VERIFICATION

I, Soo Jin KIM of 648-23 Yeoksam-dong, Gangnam-gu, Seoul, Republic of Korea state that the attached document is a true and complete translation to the best of my knowledge of the Korean-English language and that the writings contained in the following pages are correct English translation of the specification and claims of the Korean Patent Application No. 10-2003-0011831.

Dated this 31th day of July, 2007.

Signature of translator: _____

Soo Jin KIM

KOREAN INTELLECTUAL PROPERTY OFFICE

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Industrial Property Office.

Application Number: KR 10-2003-0011831

Date of Application: FEB. 25. 2003

Applicant(s): LG Electronics Inc.

COMMISIONER

[ABSTRACT OF DISCLOSURE]

[ABSRTACT]

The present invention relates to a defect management (DM) of blue-ray disc writable once.

The present invention determines a first and a second temporary defect management area on blue-ray disc records defect management information while date is recorded in the first temporary defect management area and a data recorded to the first above temporary defect management area in the second temporary defect management area while a data is ejected.

Partially, the above defect management includes the location of a last management among the defect and management information of temporary defect management area.

[REPRESENTATIVE DRAWING]

FIG .8

[INDEX WORD]

Optical recording medium, Optical disc,

blu-ray disc. BD-WO

[SPECIFICATION]

[TITLE OF THE ONVENTION]

DEFECT MANAGEMENT FOR DOPTICAL Disc WRITABLE ONCE.

[BIRBE DESCRIPTION OF THE DRWINGS]

FIG.1 a block diagram illustrating a structure of a general optical disc apparatus.

FIG.2 is a Schematic view illustrating defect management of a general Blu-ray Disc Rewritable.

FIG.3 illustrates a recording method for Blu-ray disc according to the present invention.

FIG.4 is a schematic view illustrating a method of a defect management.

FIG.5 is a schematic view illustrating a method for recording TDMA according to the present invention.

FIG.6 illustrates a DMA area in a Single Layer disc.

FIG.7 illustrates a relation between a DDS type and a recording timing.

FIG.8 illustrates a structure of a DDS according to the present invention.

FIG.9 illustrates a technical method of IDMA and a spare area full flag according to the present invention.

FIG.10 is a schematic view illustrating a

recording method of IDDS.

FIG.11 is a schematic view illustrating a recording method of a drive area associated with the IDDS according to the present invention.

FIG.12 illustrates a relation between a DFE type and a recording timing.

FIG.13 illustrates a recording method of TDFL according to the present invention.

<DESCRIPTION OF MAIN REFERENCE NUMBERS IN THE DRAWINGS>

10: optical disc 11: optical pickup

12: VDR system 13: encoder

[DETAILED DESCRITION OF THE INVENTION]

[OBJECT OF THE INVENTION]

[FILED OF THE INVENTION AND BACKROUND OF THE REALTED ARET]

The present invention relates to an optical record and play system. More practically, the present invention related to a recording method of specific information for defect management of the optical recording medium and the optical recording medium having the specific information by a recording method of information.

Optical discs are broadly used as a recording medium for recording a large amount of data. Among those, recently, a new high-density optical recording medium (HD-DVD,) such as a blue-ray disc is on development for recording and storing a video data of high picture quality and an audio data of high sound quality for a long period of time.

The blue-ray disc is HD-DVD technology and an optical recording solution for next generation and stores distinguishably larger amount of data than a conventional DVD. In recent years, the global technology specification standard for the blue-ray disc is being created.

The blue-ray disc being a global standard of HD-DVD uses far more dense blue rays of 405 nm wave length than the conventional DVD using red rays of 650 nm wave length and can store larger amount of data than the conventional DVD on a disc 1.2 mm of thickness having 0.1mm recording layer and 12 cm diameter.

Also, the blue-ray disc can store much more amount of data than the conventional DVD when a cross-section two-layers recording technology making two recording layers on one side of the disc with 0.85 NA (Lens Numerical Apertures) greatly influencing an increase of a storing capacity by closely irradiating rays passed

through a lens to the optical disc.

The blue-ray disc is high numerical aperture lens and is dense with 0.32μm track pitch. An optical disc being manufactured by using the technology can transmit data at much faster speed than DVD Rom and CD Rom. When formatting video and audio data, formatting method on conventional DVD such as MPEG 2(video), AC3, MPEG1 and layer 2(audio) can be used with compatibility. When making a HD-DVD type drive effectively protecting data, data can be stored on and reproduced from most of conventional DVD discs being presently used.

Described as FIG 1, to record a data and play a data recorded, the above blu-ray disc is divided to a optical pickup (11), a video disc recorder (VDR) system (12) and encoder (13). The optical pickup (11) records and plays a signal to optical disc (10). And the video disc record (VDR) system (12) transforms a data stream inputted form outward with a recording signal suitable to record. And finally, the encoder (13) outputs a data to the above VDR system encoding an analogue signal from outward. The above FIG. 1 illustrates a recoding and playing apparatus of the blu-ray disc rewritable.

Shown as Fig.2, The above blu-ray disc rewritable includes led-in area (LIA), data area and

lead-out area (LOA). The above front and back data area includes a Inner space area (ISA) and outer space area (OSA).

The above VDR (12) system of the optical disc apparatus transforms and encodes the outward input data as the record signal suitable to record and then recodes with the cluster corresponding to the ECC block having the fixed recording size. At this time, as described the Fig. 2, on recording the data, the VDR checks whether a defect area exists or not in the above data are.

And then, if the defect area is checked, a cluster data recorded the defect area is recorded the inner space area (ISA) alternatively. As well as, if the data record operation is over, the location information of the above defect area and the management information for checking and playing the cluster data recorded in the defect area alternatively is recorded in the above inner space area (ISA) records and stores as a defect list in the above lead area.

In brief, even if the defect area is existed in the data area of the above blu-ray disc rewritable, the cluster data recorded in the defect area is recorded in the inner space area (ISA). If the play

operation works, it can prevent from recording data and erring play operation by playing the record data recorded the above spare area in advance.

An alternative recording area and a management area of defect management information are needed to manage the defect area on the write-once blue-ray disc. Particularly, because of a characteristic of the rewritable blue-ray disc that it can rewrite data, the size of the defect management area can be small. The write-once blue-ray disc writes only once and needs a bigger size of the defect management area compared to the rewritable blue-ray disc.

Also, the regulation of the defect management on the write-once blue-ray disc, includes not only a common point, constancy and compatibility to meet standards of the rewritable blue-ray disc, but also a regulation for recording and reproducing management information more effective, stable and high efficiency.

[TECHNICAL SOULTION OF THE ONVENTION]

An object of the present invention is to provide a method of a defect management on a write-once optical recording medium such as a blue-ray disc.

Particularly, in that write once optical recording medium recodes a data, another object of the present

invention recodes in a temporary management area dividing defect management information recorded in use and a defect management information recorded in eject.

And then the defect management information which includes the recent location information of the defect management recorded in the above temporary management area provides a method of recording defect management information and optical recording medium. The above method of recording defect management information can speedily accesses to an information connected with a disc based on defect management information. The above optical recoding medium is recorded the defect management information.

[DETAILS OF THE INVENTIO]

Recording data in a optical recording medium, the present invention records a defect management information created during a update timing in a first management area. And if a disc is ejected, in a second management area, the present invention moves and record recent defect management information recorded in the above first management area.

Also the present invention relates to the defect management of the Write-once optical recording medium and the Write-once optical recording medium. The defect management of the Write-once optical recording medium records including the location information of the recent

defect management of the above management area and the Write-once optical recording medium includes the above information.

Hereinafter, the defect management of the Write-once optical recording medium described as the above will be explained referring to appending drawings as preferred embodiment.

First of all, in the present invention, to manage the defect management information effetely, TDMA, TDDS, and TDFL corresponded with a conventional area of a disc definition structure (DDS), a defect list (DFL), a disc management area (DMA) are defined as following and use together with the above DDS, DFL, DMA.

An IDDS, which 'interim DDS' area temporarily records DDS created for a defect management, is allotted in lead-in area (LIA).

And an IDFL, which 'Interim DFL' area temporarily IDFL created for the defect management, is divided into a M_IDFL and a S_IDFL. The M_IDFL is main IDFL area recorded IDFL information and the S_IDFL is secondary IDFL area stored a copy of M_IDFL for preserving and maintaining the IFDL information. The IDFL includes the M_IDFL and the S_IDFL.

The M_IDFL is allotted in an inner space area (ISA) and the S_IDFL is allotted in an outer space area (OSA). And the M_IDFL is a necessity while the S_IDFL is not a

necessity.

And the TDMA, which a temporary DMA area records defect management information created in use, is allotted in the outer space area(OSA) and consist of the TDDS and the TDFL. Also the TDMA is a structure of including a written area byte map. Wherein the written area byte map expresses mapping a cluster recorded a data by a byte.

And finally, the TDDS is a temporary DDS area recording DDS temporarily in use. The TDFL is a temporary DFL recording DDS temporarily in use.

On the other hand, in the present invention, the DMA includes the DDS and the DFL like BD-RE, and the DFL includes a header, entry, and terminator, and the entry includes stators describing an entry type and a physical sector number (PSN).

On a single layer disc, The DMA is allotted thirty two clusters and the DDS is allotted one cluster and the DFL is allotted eight clusters. And on a double layer disc, the DMA is allotted eight clusters. One cluster is thirty two sectors (or thirty two frames) and 1 sector is two thousand forty eight bytees. For reference, in BD-RE, the DDS is used in the front of one cluster partially and the most one cluster is allotted in a reserved area. But the present invention allots WAM to a useless reserved area and makes WAM include and record in DSS. Besides, the present

invention forms the DSS dividing into an IDDS and a TDDS and records using a DSS in use and a DSS in eject.

Fig.3 illustrates a construction of a recording area of a write-once blu-ray disc according to the present invention. It is allotted to a lead-in area (LIA), data area and lead-out area (LOA). Also it is allotted to a inner spare area (ISAO) and a outer spare area (OSAO).

The lead-in area is allotted DMA2, IDDS, and DMA1. The ISAO area is allotted M-IDFL and a spare area for a linear replacement and then a logic sector number (LSN) mapping from an initial value '0' to a last LSN value. Also an area for a logic overwrite (LOW) from OSAO to is defined and in a area assign for LOW, as the LOW is performed, a location performed the LOW is changing, which makes LAST_LSN changed.

Besides, a spare area for L/R, TDMA, and S_IDFL is assigned in the OSAO. Mentioned as the above, the S_IDFL need not to be defined and allotted if it is not necessary and is used to increases data preservation and maintenance In addition, the LOA is allotted a DMA3 area, a DMA4 area.

Shown as FIG.3 in the present invention, IDDS is allotted two thousand twenty four clusters and the M_IDFL and the spare area for L/R is allotted. And moreover, the OSAO area is allotted M * 256 clusters, where M can be created within the maximum value. As well as, the TDMA area

is allotted 4096 clusters and the S_IDFL area is allotted 1024 cluster.

FIG. 4 is a schematic view illustrating a defect management of the present invention. According to a order from a host, data is recorded in a data area. a data recording is divided into case 1 and case 2,wherein case 1 is when normal recording and case 2 is when normal eject. For example, in case 1, it is updated every 20M. If a defect does not exist (update#1), the WAM is changed by a result in the data recording and then the TDDS having a changed WAM is recorded in the TDMA area. But if the defect exists (update #2), a relevant data is moved and recorded in the spare for L/R the WAM according to the data recording is changed. And then the above defect entry records an additional TDFL in the above changed WAM area together with the TDMA area.

On the other hand, if the date recording is over and the normal eject is created, among the date recorded in the above TDM area, which is TDDS and TDFL, a recent TDMA information which is TTDS is recorded in the IDDS and the TDFL is recorded in the IDFL (hereinafter, referred as M_IDFL). At this time, if the S_IDFL is defined and used in the same way as the above, a copy from the information of the recent TDFL is recorded in the M_DFL is recorded in the S_IDFL area, too.

In this manner, if the recent TDMA information moves and records in the IDDS and the IDFL, on account of that, the recent DDS and DFL information are recorded in the LIA area, it obtains the above information in the early disc loading. Besides if the TDMA area is full, due to the DDS information is recorded in the IDDS area, the defect management is easer than before.

FIG.5 is a drawing illustrating a structure of the TDMA in the present invention. It shows that the TDMA area is allotted 4096 clusters and if the data is recorded, the TDDS is recorded every updating time and the TDFL is recorded every the defect management time. Also, it illustrates the TDFL area size is changed from one cluster to four clusters while the TDDS is fixed by one cluster.

If the disc is ejected, in view of the recent TDDS is moved and recorded in the IDDS and the TDFL is moved and recorded in the M_IDFL, it can deal with a loss of the conformation by copying and recording the information of the TDFL which is the M_IDFL in the S_IDFL allotted 1024 clusters.

Described as FIG. 5, the data recording of the TDMA area is recorded in the direction of +PSN while the data recoding of the spare area for L/R is recorded in the direction of -PNS.

By means of the description as the above, if the disc

is ejected, The TDDS information is equal to the IDDS information. Similarly the information recorded in the TDFL is equal to the information recorded in the M_TDFL and S_IDFL. And the TDFL size can be changed from 1 cluster and 4 clusters and the second TDFL is appeared in the direction of +PNS is composed of 2 clusters.

FIG.6 illustrates a first embodiment of the DMA area on single layer (SL) disc. Referring to FIG.6, the DMA area is made up of 32 clusters and the DDS is recorded over and over again by from 1 cluster to 4 clusters and the seven DFL is recorded over and over again by 4 clusters.

In the case of 1 cluster is allotted in The above DDS, due to a partial sector among 32sector of the DDS is used, the rest sector is reserved, the present invention allots a useless area in the WAM and records the WAM included in the DDS. It will describe the explain of this referring to FIG. 8 in future, let's examine a relationship between a DDS type and a recoding timing referring to FIG.7

FIG. 7 illustrates the relationship between a DDS type and a recoding timing. It shows the DDS is recorded by dividing into two cases According to an event. More particularly, the DSS having contents equal to the IDDS records in the DMA area, which the records timing is depended on DMA fill-in function. The DMA fill-in function means to record the information of DDS and DFL, in the case

that the defect management is not performed (non DM), or in the case that the defect management does not permit any more in view of the user data area (no more data), or in the case that the defect management does not permit due to the spare area or the IDDS/IDFL area is full (no more DM).

In Reference with the above FIG.4, An IDDS including upgraded information and the WAM is recorded in an IDDS area, which recording timing is what time the disc is ejected. In other words, if the disc is ejected, the recent TDDS recorded in the TDMA area is moved and recorded. Meanwhile, the TDDS having the contents equal to the IDDS' one is recorded in the TDMA area and records the information of the DDS being used.

In brief, mentioned as FIG.7, in the present invention, we can know some information. First are DSS classified three types. Second are the definitions of DDS, IDDS and TDDS. Third are the recording timings definition of DDS, IDDS and TDDS. In other words, the DDS is recorded by DMA fill-in function. And the IDDS is recorded while the disc is ejected. And finally the TDDS is recorded while the disc is in use.

FIG.8 illustrates the structure of the defect management according to the present invention. Shown as the above, the IDDS may have the information as same as the TDDS has. The IDDS and TDDS are consist of 32sectors

wherein the DDS information is described in the front of the first sector (sector0), and the rest 31sectors (sector1~sector31) is allotted in the WAM.

However, it is possible to record the WAM separated from the DSS. so, in this case, the rest of sectors is reserved.

Claimed as FIG.8, the information of the defect management according to the present invention includes the IDMA and the spare area full flags taking up as much as 1 byte, the information of the last recording address taking up as much as 4 bytes, the useable last cluster address of the OSA0 taking up as much as 4 bytes, the useable front cluster address of the OSA1 taking up as much as 4 bytes, the useable last cluster address of the ISA1 taking up as much as 4 bytes, the first PSN of the M_IDFL taking up as much as 4 bytes, the size information of IDFL(M_IDFL) taking up as much as 1 byte, and the first PSN of S_IDFL taking up as much as 4 bytes.

Also, mentioned as the above, to access faster than The TDDS recorded in the back of TDMA, it includes the first PSN of the (n-1)th IDDS and TDDS taking up as much as 4 bytes.

Like the above, due to the DSS including the location and size of the TDMA area, the location and size of the ISO area and the OSA area, the location and size of the M_DFL

area and the S_IDFL area, it is possible to record relevant information and recognizes a precious location and area to play.

Additionally, in the early disc loading, by means of the DSS including information which points the location of a (n-1)th IDDS or TDDS, the most recent defect management information , which is IDDS or TDDS, from the above information recognizes the location recorded speedily.

For example, if the DDS information created in use is upgraded five times, the TDMA area, the TDDS is updated in the TDMA area five times. This count value announcing that the TDDS is recorded five times is recorded. And then, if the disc is ejected, the most recent TDDS information is moved and recorded in the IDDS. Also the information recorded in the IDDS is determined the sixth updated count value. Therefore, the defect management (DDS) recorded in this IDDS includes the location information of the (n-1)th TDDS which is the fifth updated information of the TDDS. In this case, if the IDDS information is checked in the early disc loading, on the ground that the most recent location of the TDDS is found easily, it can recognize the location to record next TDDS in easy and the high speed search of the defect management is possible.

As the above, on account of the defect management, which is DDS including not only IDDS and TDDS but also DDS

within DMA, contains the location of most recent defect management(that is PSN of (n-1)th DDS) and it is possible to do high-speed search and to recognize the recording location of the next defect management preciously and quickly.

FIG. 9 illustrates a technical method of IDMA and spare area full flag according to the present invention said as FIG. 8 and defines the respective bits of a byte as following. A top bit (b7) is set while the IDDS area is full and b6 is set while the M(S) _IDFL area is full. And b5 is set while the drive area is full. And b4 is set while the TDMA area is full. Also b3 is set while the OSA1 area is full and b2 is set while the ISA1 area is full. Finally, b1 is set while the OSA0 area is full and b0 is set while the ISA0area is full.

Shown as FIG. 9, by defining the IDMA and spare area full flag, it prevents from being raised an error of the recording management of the defect management said as FIG 3 and FIG 4. Also it makes the information of the DDS and DFL disposed recognizing the state of the respective areas correctly.

FIG. 10 illustrates a method of using IDDS in present invention. The IDDS is allotted in the Lead-in area and allots 1024 clusters. To a preservation and reliability of the information, it repeatedly records the same information

by 1 cluster. If the defect in the cluster being recorded, it records the next cluster. Due to the IDDS recorded by a cluster, if 1024 clusters are allotted, the copy is not recorded. And if the defect does not exist and the copy is recorded, it is possible to deal with the maximum 1024^{th} disc ejected. The disc eject near to maximum 512^{th} in the blu-ray disc writable once is impossible to expect a figure in the real utility environment. It is enough to manage the IDDS.

FIG. 11 illustrates a method of using the drive area associated with the IDDS in the present invention. If Referring to BD-RE, a drive area is the information recorded in the lead- in area (LIN) and the information related to a drive spec. but the present invention allots 1024 clusters. In FIG. 11, the drive area stores the copy of the related information. If the defect is created in the drive area, it records the information related the drive in the next cluster. The IDDS according to the present invention includes most recent of the first PSN of drive area recorded. Likewise, the IDDS can obtain the information connected with the drive by including the first PSN of drive area.

FIG. 12 shows a relationship between the DFL type and the recording timing in the present invention. The present invention defines DFL as DFL, IDFL and TDFL. And the IDFL

is defined as M_IDFL and S_IDFL. This S_IDFL, a copy of the M_IDFL, need not to use.

The DFL has a size of 4 clusters and is recorded in the DMA area by the DMA fill-in. the size of M(S) _IDFL is changed within from a cluster to 4 clusters. And M(S) _IDFL is recorded in the allotted M(S) _IDFL area mentioned as FIG.3. And the recording manner while the disc is ejected is the same as the above.

In brief, in the present invention, the DFL is defined being divided into DFL, IDFL and TDFL. More partially, The DFL records in the DMA area base on the DMA fill-in and the TDFL records in the IDFL area while the disc is ejected and the TDFL records in the TDMA in use. Especially, the M_IDFL and S_IDFL is divided and defined in the case of the IDFL. Also S_IDFL need not to use and the content of S_IDFL is the copy of the M_IDFL and can use to insure the preservation and reliability of the information.

FIG. 13 shows a method of recoding the IDFL in the present invention. It is allotted 1024 clusters into the ISAO area. The M_IDFL occupies a half of the ISAO allotted 2048 cluster. And the IDFL is recorded from the front the ISAO area after another. And that size is used within from a cluster to 4 clusters changeably. Meanwhile, if the S_IDFL is used, the contents as same as the above M_IDFL' one is recorded from that front after another in the area

of the same size as the size of the M_IDFL allotted in the back of OSA0 area. And the IDDS of the LIA makes reference to the location of the most recent defect management (that is the location of the M_IDFL. Likewise, by the IDDS including the location information of the M_IDFL, the defect management is always performed based on the most recent information.

FIG. 4 illustrates a method of updating the IDFL schematically in the present invention. Updating the IDFL is based on the cumulative recording by cluster as shown as FIG.4.

For example, the two IDFL is recorded in the case of a first update. And the three IDFL is recorded in the case of a second update recording the one IDFL additionally. This three IDFL are the two IFDL recorded during the first update and the one IDFL recorded during the second update. Also, the four IDFL is recorded in the case of the third update recording the two IDFL additionally. This four IDFL are the two IFDL recorded during the first update, the one IDFL recorded during the second update and the last two IDFL. As a result, the last is the IDFL including all the update information and all the update histories.

If the IDFL size is over a cluster, the IDFL is updated in the form of one group composed of two clusters. And if the IDFL size is over a two clusters, the IDFL is

updated in the form of one group composed of three clusters and then allots into IDFL by a maximum four clusters. In brief, the IDFL size may be changed from one cluster to four clusters.

As the above description, if the update is performed cumulatively, it is possible to record even though a past history and to recognize all the defect information only by one IDFL updated ultimately. Especially, the security of information preservation is ensured by cumulatively recording every updating the IDFL. Also by the DSS pointing at the latest PSN of the DFL, the IDFL size needs not to be one cluster in recognizing the relevant information.

[ADVANTAGES OF THE INVENTION]

The present invention records WAM into the DSS in recording a defect management information on a blu-ray disc writable once in a TDMA. Also the present invention is possible to record and manage the defect management information effetely by disposing the DDS record in use and the DSS record in eject differently.

Moreover, in recoding and managing the defect management on the blu-ray disc writable once, the present invention defining a TDMA area including a TDDS and a TDFL records the TDDS including the changed WAM if a disc is in use. Also the present invention records a TDFL appending a

defect entry if a defect exists. Finally, the present invention records the above latest TDMA information moved in an IDDS and a TDFL. The IDDS is allotted in a lead-in area and the IDFL is allotted in an ISA area.

Meanwhile, due to the defect management information pointing at the location of the latest IDDS and TDDS, it is easy to obtain the information required in the early disc loading. Also, in the defect management, if the TDMA area is full, it is very effect to record the DSS information including the above WAM into IDDS only in case that disc is ejected.

what is claimed

1. A method for managing a defect management of a blu-ray disc writable once includes:

Recording the defect management information created in use into a first management area if it is updated;

Moving and Recording the latest defect management information recorded in the above first management area into a second management area; and

Recording the above defect management information what contains the latest defect management location of the above management area.

2. In claim 1, a method for managing a defect management of a blu-ray disc writable once wherein the above first management area is a TDMA area allotted in outer spare area and the second management area is a IDDS area allotted a lead-in area

3. In claim 1, a method for managing a defect management of a blu-ray disc writable once wherein the above first management area is a TDMA area that is allotted in outer spare area and includes a TDDS and a TDFL and the above second management area is allotted in a lead -in area and finally, a (n-1)th IDDS and TDDS describing the

location of the above latest defect management.

4. In claim 1, a method for managing a defect management of a blu-ray disc writable once wherein the latest defect management of a relevant disc is checked from the location of the above latest defect management.

5. A blu-ray disc writable once:

Records a defect management created in use when updating into a first management area;

Records the latest defect management recorded in the above first management area when disc is ejected into a second management area;

Records the above defect management information what contains the latest defect management location of the above management area.

6. In claim 5, a blu-ray disc writable once wherein the above first management area is a TDMA area allotted in outer spare area and the second management area is a IDDS area allotted a lead-in area.

7. In claim 5, a blu-ray disc writable once wherein the above first management area is a TDMA area that is allotted in outer spare area and includes a TDDS and a TDFL and the above second management area is allotted in a lead

-in area and finally, a (n-1)th IDDS and TDDS describing the location of the above latest defect management.

8. A blu-ray disc writable once wherein the latest defect management of a relevant disc is checked from the location of the above latest defect management.

FIG. 1

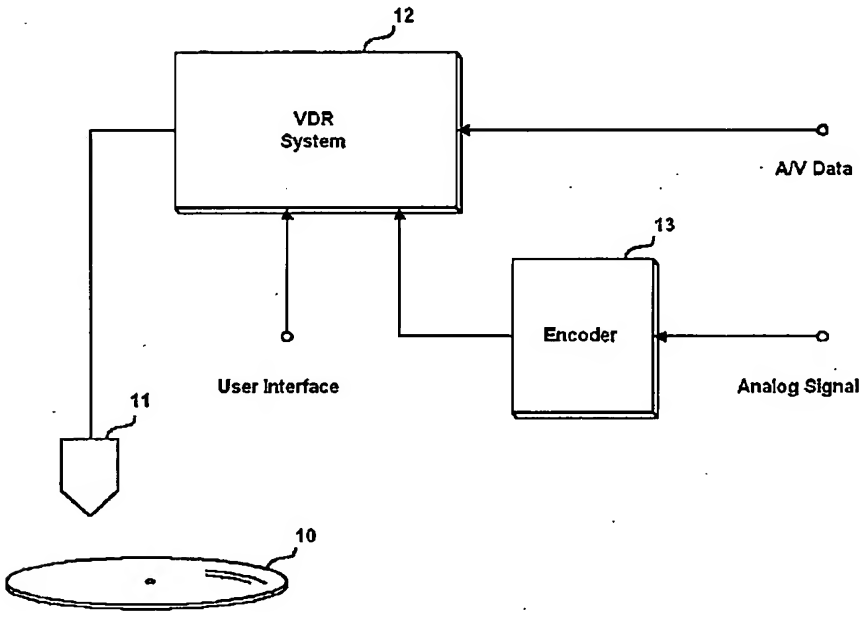


FIG. 2

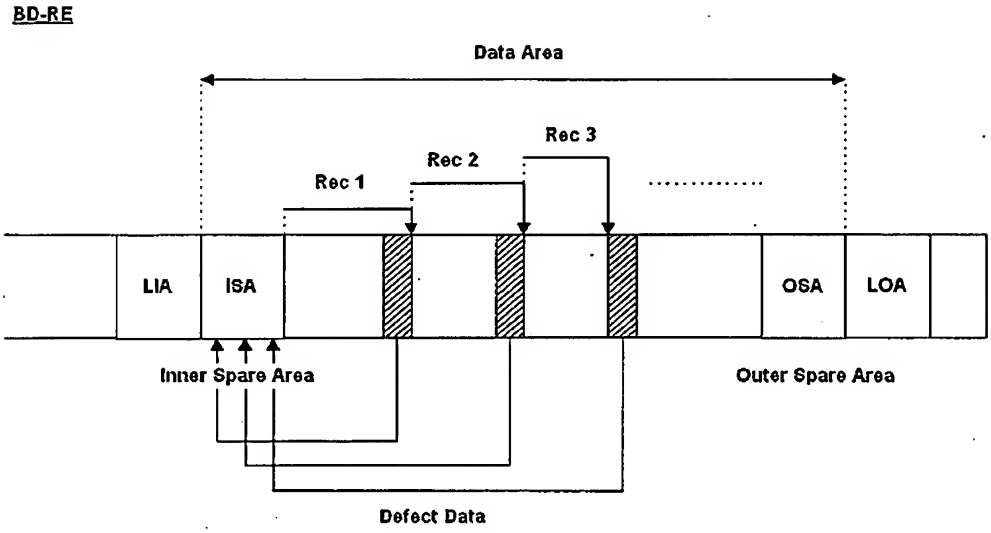

BD-RE
Data Area
Rec 1
Rec 2
Rec 3
LIA
ISA
OSA
LOA
Inner Spare Area
Outer Spare Area
Defect Data

FIG. 3

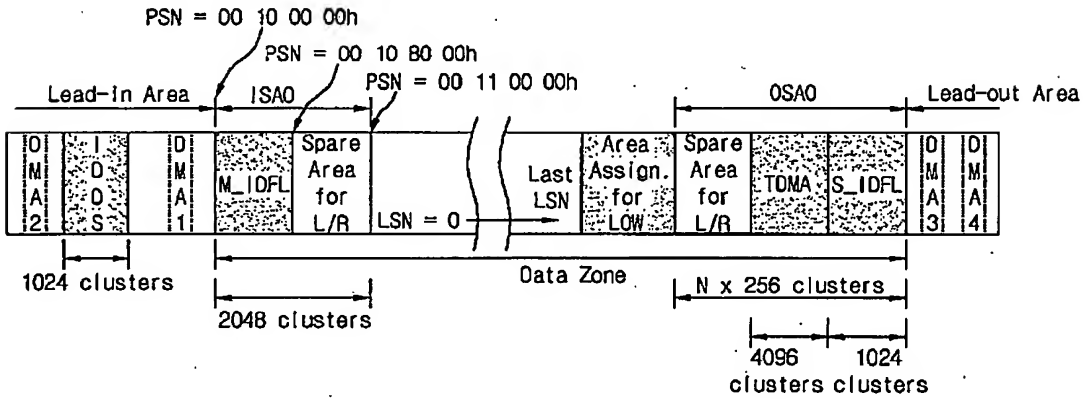
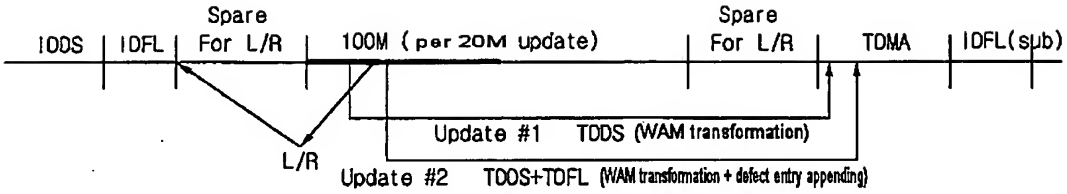

PSN = 00 10 00 00h
PSN = 00 10 80 00h
PSN = 00 11 00 00h
Lead-In Area
ISA0
OSA0
Lead-out Area
DMA2
IDDS
DMA1
M_IDFL
Spare Area for L/R
LSN = 0
Last LSN
Area Assign. for LOW
Spare Area for L/R
TDMA
S_IDFL
DMA3
DMA4
1024 clusters
2048 clusters
Data Zone
N x 256 clusters
4096 clusters
1024 clusters

FIG. 4



1 cluster = 64k
20M byte = 310 clusters

FIG. 5

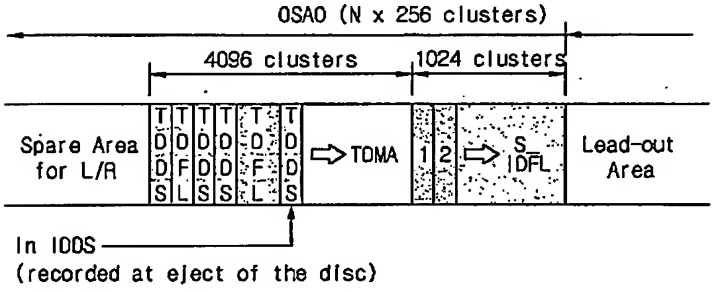


FIG. 6

Clusters 1 ~ 4	DDS (4 repetitions)
Clusters 5 ~ 8	DFL
Clusters 9 ~ 12	DFL (2nd repetition)
⋮	⋮
Clusters 29 ~ 32	DFL (7th repetition)

FIG. 7

Type	Contents	Location	Recording Timing
DDS	Same as IDDS	DMA Area	At DMA fill-in function
IDDS	Including update information and WAM	IDDS Area	At eject of the disc
TDDS	Same as IDDS	TDMA Area	During use

FIG. 8

	Contents	Number of Bytes
	:	:
	Interim DMA and Spare Area full flag	1
	:	:
Sector 0	Last Recorded Address (LRA)	4
	The first usable Cluster address in the Inner Spare Area 0	4
	The last usable Cluster address in the Outer Spare Area 0	4
	The first usable Cluster address in the Outer Spare Area 1	4
	The last usable Cluster address in the Inner Spare Area 1	4
	The first PSN of M_IDFL	4
	The size of M(S)_IDFL	1
	The first PSN of S_IDFL	4
	The first PSN of the (n-1)th IDDS/TDDS	4

FIG. 9

b7	b6	b5	b4	b3	b2	b1	b0
IDDS Area full	M(S)_IDFL Area full	Drive Area full	TDMA Area full	Outer Spare Area 1 full	Inner Spare Area1 full	Outer Spare Area 0 full	Inner Spare Area0 full

FIG. 10

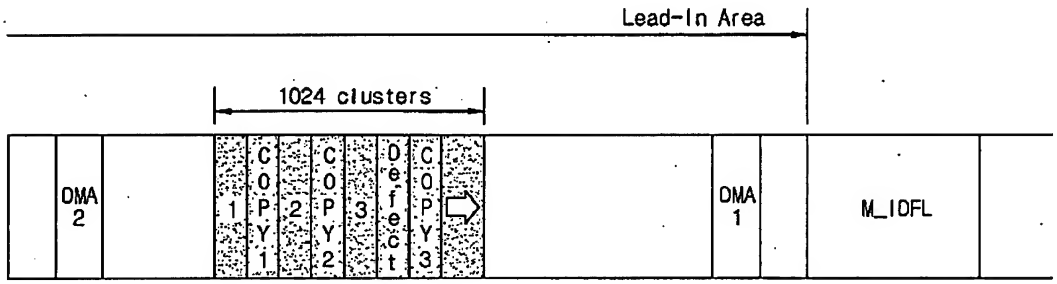


FIG. 11

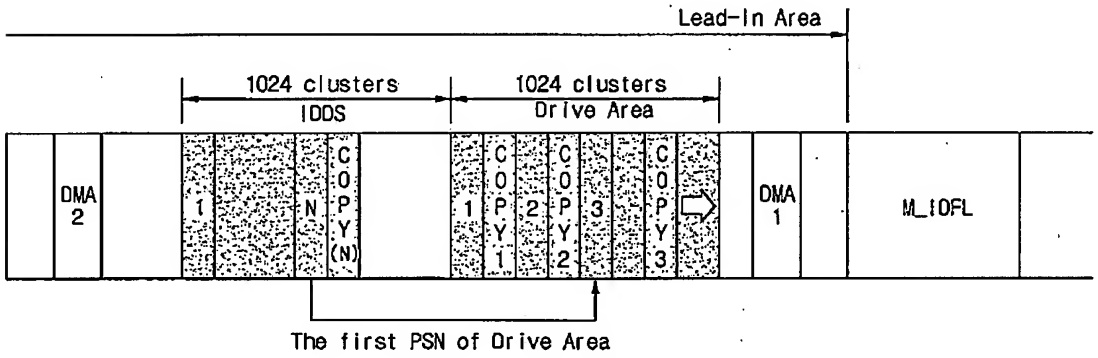


FIG. 12

Type	Size	Location	Recording Timing
DFL	4 clusters	DMA Area	At DMA fill-in function
M(S)_IDFL	Varying from 1 to 4 clusters	M(S)_IDFL Area	At eject of the disc
TDFL	Varying from 1 to 4 clusters	TDMA Area	During use

FIG. 13

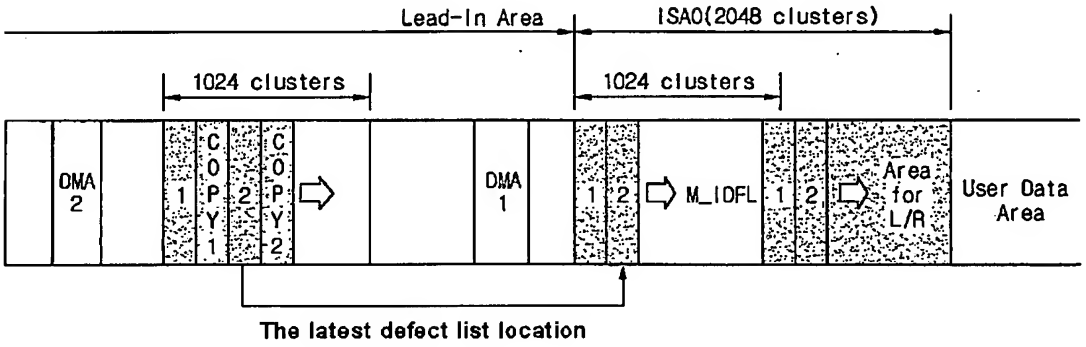


FIG. 14